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EXAMINER	
BLOOM, NATHAN J	

ART UNIT	PAPER NUMBER
2624	

NOTIFICATION DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/711,037	CHAO, PO-WEI	
	Examiner	Art Unit	
	NATHAN BLOOM	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 April 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on April 3rd, 2008 has been entered.

Response to Arguments

2. Applicant's arguments with respect to claims have been considered but are moot in view of the new ground(s) of rejection. See below for further explanation.

Applicant argues on page 7 line 24 to page 8 line 13 that Ji only teaches the calculation of a single value using MVD and MHD. Examiner would like to point to figures 4-5 and paragraphs 0070-0077 wherein the MVD and MHD are described as averages of sets of difference values. Thus Ji teaches the calculation and use of first and second difference sets. Furthermore, as per the rejection of claim 21 below, Ji has taught the selection of "candidate angles" using MVD and MHD wherein both MVD and MHD represent gradient characteristics of the image (Note: Differences between pixels in an image represent gradient characteristics of an image.)

Applicant argues on page 8 line 27 to page 9 line 19 that Campbell teaches only a single difference algorithm. However, as per the rejection of claim 1 Campbell has taught the

calculation of V311 (first pixel difference set) and V312 (second pixel difference set). Furthermore, these difference sets are calculated by algorithms that differ by obtaining and comparing pixels from different positions within the image.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claim 21 is rejected under 35 U.S.C. 102(e) as being anticipated by Ji (US 2005/0073607).

Instant claim 21: An intra-field interpolation method for generating a target pixel value, the method comprising:

receiving a plurality of pixel values of an image; [*Ji in paragraph 0010 and figures 1 and 2 teaches the measuring of an edge gradient using a series (plurality) of pixels. It is implied that these pixels have been received from an image source of some type, else there would be no values to operate on.*]

generating a first pixel difference set from the received pixel values using a first pixel difference algorithm; [*Ji teaches in figures 2 and 5 and the corresponding description in*

paragraphs 0054 and 0058 the measurement of the vertical differences (first pixel difference set) between the parallel lines of pixels. This algorithm as taught by Ji creates the vertical difference values and then calculates a mean of these values.]

calculating differences among a plurality of pixel values of an image line of the image field, to indicate a gradient characteristic of the pixel values of the image line; [*Ji teaches in figures 2, 4-5 and the corresponding description in paragraphs 0054 and 0058 the measurement of an average of the horizontal differences between pixels in the same image line (see figure 4), and vertical differences between pixels in the other image line (see figure 5). Furthermore, the differencing described by Ji is used to indicate the gradient characteristic of the pixel values (paragraph 0062).*]

selecting a plurality of candidate angle according to the first pixel difference set and the gradient characteristic; [*Ji teaches in paragraphs 0058, 0066-0068, 0071-0073, 0078-0080, 0083-0088, and 0107 the selection of whether the general direction of the plurality of candidate angles are, whether they are more horizontally oriented or more vertically oriented, by comparing the MVD (vertical difference) with the MHD (horizontal difference). If the horizontal difference is greater a vertical angle is selected (paragraphs 0058 and 0107, and figures 6A-6M) else the other angles are selected as candidates and the ELA interpolation method is performed.*]

generating a second pixel difference set from the received pixel values using a second pixel difference algorithm, wherein the first pixel difference algorithm is substantially different from the second pixel difference algorithm; and [*Ji teaches in figures 2 and 6(A-M) and the corresponding description in paragraphs 0058-0065, 0086, 0100-0108 the generation of pixel*

correlation (second pixel difference algorithm) by differencing corresponding pairs of pixels as is depicted in figures 6A through 6M.]

blending a plurality of pixel values derived from the received pixel values according to the candidate angles, the first pixel difference set and the second pixel difference set, to generate the target pixel value. [*Ji teaches the selection of the angle by first determining a general orientation (candidate angles, whether they are more horizontally or vertically oriented) using the gradient characteristics and the first pixel differences (see paragraphs referred to above), and then applies a second set of pixel differences that narrow the angle selection down to the angle corresponding to the pixel pair having the smallest difference (as determined by the second difference set). Then the interpolating unit 240 of figure 3 perform the interpolation (blending) of a plurality of pixel values as described in paragraphs 0100-0108 (example interpolation equations are shown using a plurality of pixel values).*]

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1 and 3-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Campbell (US 6133957) in view of Hahn (US 7092033).

Instant Claim 1: An intra-field interpolation method for generating a target pixel value, the method comprising:

receiving a plurality of pixel values of an image field; [*Campbell: Fig 1 and 5 shown the plurality of pixels, Fig. 3 depicts the operations performed including the memory (10) for storing the pixels.*]

generating a first pixel difference set from the received pixel values using a first pixel difference algorithm; [*Campbell: Fig 2 steps S20 and S30, Fig 3 items 20 and 30. Campbell describes in column 3 lines 60+ and column 4 line 1 the first pixel difference set as V_{311} wherein the difference between the pixels is measured and the pixels of Figure 1 are used as an example.*]

generating a second pixel difference set from the received pixel values using a second pixel difference algorithm, wherein the first pixel difference algorithm is substantially different from the second pixel difference algorithm; [*Campbell: Fig 2 steps S20 and S30, Fig 3 items 20 and 30. Campbell describes in column 4 lines 2-15 the second pixel difference set as V_{312} wherein the difference between the pixels is measured and the pixels of Figure 1 are used as an example. Furthermore, the second difference set taught by Ji is substantially different from the first pixel difference set in that the differencing algorithm pulls pixel values from different positions (different from first set) in the image.*] and

blending the received pixel values according to the first pixel difference set and the second pixel difference set, to generate the target pixel value. [*Campbell describes the blending of pixel differences in interpolation but does not do so between the 1st and 2nd pixel difference set. However, Hahn discloses an interpolation method in which the gradients are calculated between*

pixel and weights are assigned to each of these such that the target pixel to be interpolated is calculated based on the weights of these gradients. Hahn described this in Figures 1-3, column 3 lines 24-63, and column 4 lines 3-33. Campbell and Hahn both teach deinterlacing methods and it would have been obvious to combine the teachings of Campbell with Hahn to improve the accuracy of the deinterlacing.]

Instant Claim 3: The intra-field interpolation method of claim 1, wherein the pixel values of the image field comprises pixel values of at least one upper line of the target pixel value, and pixel values of at least one lower line of the target pixel value. [*Campbell: Figure 1. Hahn: Figures 1-2.*]

Instant Claim 4: The intra-field interpolation method of claim 3, wherein the first pixel difference set is generated from the pixel values of the upper line and of the lower line. [*See equation for V_{311} and Figure 1 of Campbell identified in rejection of instant claim 1.*]

Instant Claim 5: The intra-field interpolation method of claim 3, wherein the second pixel difference set is generated from the pixel values of the upper line and of the lower line. [*See equation for V_{312} and Figure 1 of Campbell identified in rejection of instant claim 1.*]

Instant Claim 6: The intra-field interpolation method of claim 1, wherein each entry of the first pixel difference set is generated by calculating the differences among a plurality of pixel values of the image field along a corresponding direction. [*See equation for V_{311} and Figure 1 of Campbell identified in rejection of instant claim 1.*]

Instant Claim 7: The intra-field interpolation method of claim 1, wherein each entry of the second pixel difference set is generated by calculating the differences between a plurality of pixel values of the image field and a plurality of reference pixel values along a corresponding direction. [*See equation for V_{312} and Figure 1 of Campbell identified in rejection of instant claim 1.*]

Instant Claim 8: The intra-field interpolation method of claim 1, further comprising: calculating the differences among a plurality of pixel values of an image line of the image field, to indicate a gradient characteristic of the pixel values of the image line. [*A gradient defines the amount of change in a direction. The equations V_{312} and V_{311} disclosed by Campbell define the difference between pixels in a given direction.*]

Instant Claim 9: The intra-field interpolation method of claim 8, wherein the image line is an upper line of the target pixel value. [*Campbell Figure 1.*]

Instant Claim 10: The intra-field interpolation method of claim 8, wherein the image line is a lower line of the target pixel value. [*Campbell Figure 1.*]

Instant Claim 11: The intra-field interpolation method of claim 8, further comprising: selecting an angle of blending referencing to the gradient characteristic of the pixel values of the image line [*As discussed earlier Campbell disclosed a system that measures pixel differences of the upper and lower lines and selects an angle of interpolation. However, Campbell does not disclose blending of these angles, but Hahn disclosed the blending/weighting of different angles of interpolation based on the calculated gradients. See the sections of Hahn referred to in rejection of instant claim 1.*]

Instant Claim 12: The intra-field interpolation method of claim 1, further comprising: selecting an angle of blending according to the first pixel difference set and the second pixel difference set. [*As pre rejection of instant claims 1, 8, and 11 Campbell has disclosed the 1st and 2nd pixel difference sets (related to gradients) and Hahn has disclosed the blending of the gradients (difference sets) and selection is performed by choosing the minimal sets and assigning greater weights to these.*]

Instant Claim 13: The intra-field interpolation method of claim 12, further comprising: storing information relating to the angle of blending resulted from the course of a previous step of selecting the angle of blending. [*Although storing of the information was not explicitly disclosed in Hahn Examiner takes Official Notice that this is a required step. In order to compare these values for selection of the correct blending that it would have been notoriously well known to one of ordinary skill in that art that it would have been necessary to store the difference sets (gradients) and the selected weights and angles of interpolation in order to perform the weighted interpolation.*]

Instant Claim 14: The intra-field interpolation method of claim 13, wherein the angle of blending is selected referencing to the stored information, in addition to the first pixel difference set and the second pixel difference set. [*See rejection of instant claim 13.*]

Instant Claim 15: The intra-field interpolation method of claim 1, wherein the blending step comprises: weighted blending a first derived pixel value and a second derived pixel value of the received pixel values of the image field. [*Disclosed by Hahn and Campbell as per rejection of instant claims 1, 8, and 11.*]

Instant Claim 16: The intra-field interpolation method of claim 15, wherein the first derived pixel value is derived from a plurality of pixel values along a selected angle of blending. [*See Hahn and Campbell (column 12 lines 15-2) wherein interpolation is performed using at least 2 pixels in the determined direction(s) of interpolation.*]

Instant Claim 17: The intra-field interpolation method of claim 15, wherein the second derived pixel value is derived from a plurality of pixel values along a normal axis. [Hahn in the sections listed for rejection of instant claims 1,8, and 11 and in the reference Figure 1 has disclosed the use of the normal axis as a direction of interpolation.]

Instant Claim 18: The intra-field interpolation method of claim 1, wherein the blending step comprises: calculating a first weighting factor according to pixel values along a selected angle of blending. [See rejection of instant claims 15 and 16.]

Instant Claim 19: The intra-field interpolation method of claim 18, wherein the blending step further comprising: weighted blending the received values of the image field according to the first weighting factor. [*Hahn has disclosed in the previously mentioned sections the weighted blending of interpolation by 2 or more weighting factors.*]

Instant Claim 20: The intra-field interpolation method of claim 18, wherein the blending step further comprising: calculating a second weighting factor; and weighted blending the received values of the image field according to the first weighting factor and the second weighting factor. [*Hahn has disclosed in the previously mentioned sections the weighted blending of interpolation by 2 or more weighting factors.*]

7. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Campbell in view of Hahn as applied to claim1 above, and further in view of De Haan (PCT Pub WO03/038753, also published as US 7206027).

Instant Claim 2: The intra-field interpolation method of claim 1, further comprising: low-pass filtering the received pixel values. [*Campbell and Hahn do not teach the pre-filtering of the interlaced data. However, De Haan in column 2 lines 1-7 and column 3 lines 17-43 (US 7206027) has taught the LPF pre-filtering to decrease the impact of edges and decrease the noise sensitivity of deinterlacing (interpolation). Campbell, Hahn, and De Haan all teach deinterlacing/interpolation method. It would have been obvious to one of ordinary skill in the art at the time of the invention to improve the deinterlacing method of Campbell and Hahn by combining the teachings of Campbell and Hahn with De Haan to decrease the noise of the deinterlaced image/video.*]

8. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ji as applied to claim 21 above, and further in view of Yamashita (US 5347599).

Instant claim 22: An intra-field interpolation method for generating a target pixel value of a target additional pixel, the method comprising:

receiving a plurality of pixel value of an image field; [*See rejection of claim 21.*]

generating a first pixel difference set from the received pixel values using a first pixel difference algorithm; [*See the rejection of claim 21.*]

generating a second pixel difference set from the received pixel values using a second pixel difference algorithm; [*See the rejection of claim 21.*]

selecting an angle of blending according to the first pixel difference set, the second pixel difference set, and a known angle of blending utilized for obtaining a pixel value of a previous additional pixel processed prior to the target additional pixel; and [*Ji teaches the creation of the difference sets and using these to determine an angle for interpolation, but does not teach the use of a previous angle of interpolation in selecting an angle for interpolation. However, Yamashita teaches a method of intra-field interpolation (see figure 9 for pixels and pixel to be interpolated). Yamashita, introduces a step in this interpolation process such that if the correlation (differences) between the pixels is such that there is no angle of interpolation that has high correlation then the previously determined angle of interpolation ("selects previous angle of blending"). Yamashita teaches this concept in column 17 lines 1-35, and that this additional step prevents incorrect angle selection and, reduces interpolation error (column 2 lines 38-45 of Yamashita). It would have been obvious to one of ordinary skill in the art to combine the teachings of Yamashita and Ji to reduce the interpolation error by using the previously determined angle of interpolation (blending) if the correlation requirement is not met.*]

obtaining the target pixel value through blending a plurality of pixel values along the angle of blending. [*See the rejection of claim 21.*]

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nathan Bloom whose telephone number is 571-272-9321. The examiner can normally be reached on Monday through Friday from 8:30 am to 5:00 pm (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mehta Bhavesh, can be reached on 571-272-7453. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

NB
/Brian Q Le/
Primary Examiner, Art Unit 2624
Monday, June 02, 2008